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THE FUNCTION OF AN ELECTRIC MOTOR

By Ching Chiang

- COMMUNIST CHINA -

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## FOREWORD

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## THE FUNCTION OF AN ELECTRIC MOTOR

- COMMUNIST CHINA -

[Following is a translation of an article written by Ching Chiang in Ta Kung Pao, Peiping, 9 November 1960, page 3.]

There are many types and specifications of electric motors (generally known as motors or electric rotors). If one does not know the function and characteristics of a motor, many difficulties will be encountered in selecting, using and repairing a motor.

On the top of each electric motor, there is attached a small piece of metal, with symbols and numbers to indicate the function and characteristics of the particular motor. If one knows the meaning of these items, he will understand the basic functions.

On this small piece of metal attached to the motor, the following several principal items are generally inserted:

### Three Phase Induction Electric Motor

Voltage:  $\frac{1}{2}$  220/380 volts      Current: 3.1/1.79 amperes

Power: 0.65 Kw.      Rev. min.: 1430      Frequency: 50

### Let's First Discuss "Three Phase"

The electricity generated by a power plant is "three phase". The reason that it is called "three phase" is that three transmission lines carry the electricity. If the electric motor is similarly composed of three separately wound coils, which are connected with three out-going wires and which are in turn connected to three power lines, thus a circuit is completed and the motor turns. So, such a motor is called "three phase". In using a "three phase" motor, the burden of carrying the current is divided onto three wires so

that the wires can be of smaller size and the structure of the motor can also be smaller. Most of the large- and medium-size electric motors are made under the three phases principles. There are some motors composed of a single coil and only two out-going wires, connecting one power line and the other the neutral line; such a motor is called the single phase electric motor. The smaller power electric motor does not need the complicated three phases but just the single phase.

### Voltage Rating

Voltage rating indicates the suitable applied voltage to the motor. In the above example, "Voltage: 220/380 volts" indicates that this electric motor, if it uses different wire connections, may be used separately for 220 or 380 voltage source (volt is an electric unit, generally represented by V). If the motor is connected to an electric source greater than the specified source, it will burn out; if it is connected to a smaller source, it will not operate.

### What "Current" Indicates

On the small plate, the insertion "Current: 3.1/1.79 amperes" indicates that in using the motor, if the 220 volt source is applied, the maximum current should not surpass 3.1 amperes, and if the 380 volt source is applied, the electric current should not surpass 1.79 amperes (this can be measured by an ampere meter). If the specified amperage is exceeded, i.e., exceeding the current rating, and this situation is prolonged, the motor will burn out.

### What Is Power

The power of an electric motor is indicated by "horse power". At present, most electric motors use kilowatt (or KW) to indicate power (one kilowatt equals 1.36 horsepower. In the above example, the motor 0.65KW is equivalent to 0.88 horsepower. As to the "revolution/minute", this means the motor makes so many revolutions per minute. The "rev./min.: 1430" means that this motor makes 1,430 revolutions in a minute. The revolution speed is sometimes represented by "R.P.M.", e.g., "R.P.M. 1430".

### What is Frequency

Frequency refers to the number of positive and negative peaks reached by the alternating current in each second. The

current generated by the power plant has a fixed frequency. In the above example, "Frequency: 50" indicates that this motor is suitable for an alternating current that has 50 positive and negative peaks.